pumping axis for probing the polarization angle of the noble gas atoms within the vapor cavity;

a second light detector in optical communication with the second laser beam and vapor cavity, the second light detector connected to a second servo mechanism for maintaining the wavelength of the second laser beam detuned from the carrier wavelength of the alkali-metal atoms; and

at least two perpendicular polarization filters in optical communication with the second laser beam and second light detector.

14. A method of sensing and measuring mechanical rotation of an object, the method comprising the steps of:

providing a vapor cell including a vapor cavity containing a vaporized source of alkali-metal atoms and noble gas atoms;

providing a first laser source in optical communication with the vapor cavity and a first light detector, the first laser source adapted to direct a first laser beam into the vapor cavity for optically pumping the alkali-metal atoms within the vapor cavity to an excited state, the first laser beam adapted to induce a nuclear spin polarization in the noble gas atoms;

providing a second laser source in optical communication with the vapor cavity and a second light detector, the second laser source adapted to direct a second laser beam into the vapor cavity transverse to the first laser beam for probing the nuclear spin polarization of the noble gas atoms therein;

measuring the rotation angle of the noble gas atoms within the vapor cavity; and

outputting a measure of the mechanical rotation of the gyroscope.

15. The method of claim **14**, further comprising of steps of:

providing a magnetic field source configured to produce a magnetic field within the vapor cavity; and

activating the magnetic field source to cancel the net magnetic filed resulting from the nuclear spin polarization of the nobler gas atoms within the vapor cavity.

16. The method of claim **14**, further comprising of steps of:

providing a first servo mechanism in communication with the first laser source and the first light detector; and

locking the current supplied to the first laser source at a wavelength using feedback signals from the first light detector, said wavelength from the first laser source corresponding to the carrier wavelength of the alkali-metal atoms within the vapor cavity.

17. The method of claim **16**, further comprising of steps of:

providing a second servo mechanism in communication with the second laser source and the first light detector; and

locking the current supplied to the first laser source at a wavelength using feedback signals from the second light detector, said wavelength from the second laser source corresponding to a wavelength detuned from the wavelength of the alkali-metal atoms within the vapor cavity.

18. The method of claim **14**, wherein said step of measuring the rotation angle of the noble gas atoms within the vapor cavity includes the steps of:

providing a set of perpendicular filters in optical communication with the second laser beam and vapor cavity; and

nulling the sense beam radiation produced by the second laser beam.

19. The method of claim **14**, further comprising the steps of:

providing a heater source adjacent the vapor cell for heating the vapor cavity; and

maintaining the pressure of the alkali-metal atoms within the vapor cavity at a desired level by heating the vapor cavity with said heater source.

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